

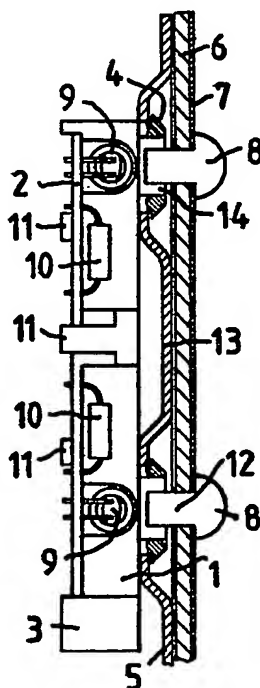
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## (54) Domestic or industrial appliances

(57) An appliance, with a cupboard-shaped housing and a plate (6) having signal, indicator and operating elements in the region of one wall of the housing, includes a printed circuit board (2) equipped with lamps (9). The board (2) is inserted into a

support component (1) which seats the board and which is engaged either directly with the removable plate (6) or with a mounting sheet (5) of the housing which supports the plate. The plate (6) carries illuminable elements (8) which are optically in communication via integrally formed light conducting stems (12) with the lamps for the indication of operating states.



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FIG.1

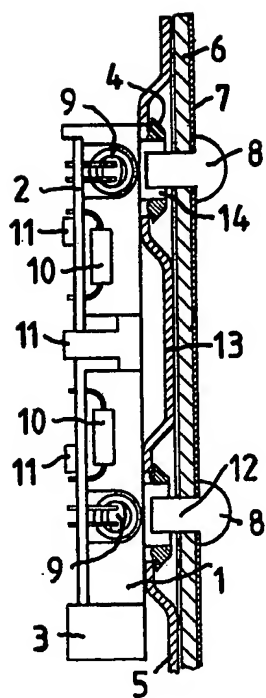
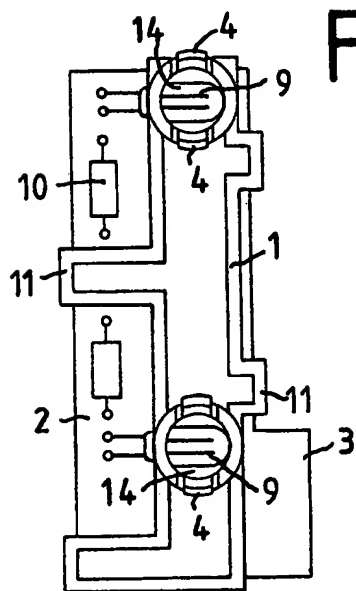


FIG.2



# SPECIFICATION

## Improvements in or relating to domestic or industrial appliances

The present invention relates to a household or industrial appliance.

Appliances are known with a cupboard-shaped housing and plate displaying signalling, indicating and operating elements in the region of one wall of the housing. There is a need in such an appliance for the plate to be removable without loosening the electrical connections to the signal elements, so that the signal elements, which are housed in a constricted space, are easily accessible and their lamps are simple to replace. According to the present invention there is provided a domestic or industrial appliance comprising a housing provided with a display panel, a support mounted in association with the panel, a printed circuit board mounted on the support and provided with at least one electric lamp, and at least one illuminable element mounted in the panel and provided with a light-conducting stem arranged to transmit light from the or a respective lamp to the element.

Because the or each illuminable element, which can be plugged into the panel together with its stem is separated from electrical connections and the associated lamp, removal of the plate without separating electrical connections is possible. If the support is mounted directly on the panel, only mounting devices that can be provided need to be released. If the support is mounted on a mounting element, in front of which the panel is disposed, then only a terminal connection or screwed connection between the mounting element and the panel may need to be released. Direct connection of the panel to the support or a relatively flat-shaped mounting element disposed therebetween makes possible a shallow installed depth between the printed circuit board, the or each lamp and the or each illuminable element, it being possible for the stem of the or each illuminable element to be made very short. Also, for a type of appliance with a very deep panel this tolerance can be compensated for in a simple manner by the insertion into the panel of an illuminable element with a longer stem.

An embodiment of the present invention will now be more particularly described by way of example, with reference to the accompanying drawings, in which:

Fig. 1 is a longitudinal section through the portion of a display unit of a household appliance equipped with signal display elements; and

Fig. 2 is a plan view of a printed circuit board and support component of the display unit.

Referring now to the drawings, a plate 6 with signal elements for indicating, for example, operating state, programme sequence and faults, is arranged on the front wall or a cover of the housing of an appliance (not shown) such as a refrigerator cabinet, a freezer cabinet, a dish-washing, washing or drying machine, an oven, furnace or the like.

A printed circuit board 2, forming a base, is inserted into a cover-shaped support component 1 of plastics material, a plurality of lamps 9, for example glow discharge lamps, and possibly other electrical components 10 being disposed on the board 2. The board 2 is connected at a tapping point 3 via individual or group plugs (not shown) to the electrical control device for the household appliance.

In the illustrated embodiment, a mounting sheet 5 or a mounting component of plastics material, to be fitted to one wall of the housing of the appliance, is arranged between the support component 1 and the plate 6. The mounting sheet 5 has apertures in which locking elements 4, such as hooks or the like, integrally formed on the support component 1 are snap-engaged. The mounting sheet 5 also forms supports 13 for the plate 6, which is to be secured to the mounting sheet or the wall of the housing by means of a clamped connection or screw connection (not shown).

The signal elements consist of illuminable or luminous elements 8 with integrally formed light conducting bars 12, which are plugged into the plate 6 to form a firm seating for them. For the light conducting connection, but physically separate arrangement, of the signal elements and the printed circuit board 2 together with lamps 9, the bars 12 project through apertures 14 in the support component to a region just above the lamps 9 in the lamps spaces enclosed by the support component 1 and printed circuit board 2. On the visible side of the plate 6, a cladding 7 of metal, wood, plastics or the like is fitted. For retaining the printed circuit board 2 on the support component 1, resilient tongues 11 are integrally formed on the support component.

The moulded depth of the mounting sheet 5 enables compensation for or variation of the depth of the appliance in the region of the plate. By means of the elements 8 with bars 12 of different lengths, it is possible in a simple manner for the signal elements to be adapted to the depth of the plate. For closely spaced elements 8 of an indicator system, the bars 12 can be constructed with a curved shape extending to lamps 9 disposed at differing positions. Without modifying the electrical connections, the printed circuit board, the support component or — if applicable — the mounting sheet, adjustment to different appliances is possible by varying the length and shape of the bars 12 and elements 8 and by modifying the plate 6.

## CLAIMS

1. A domestic or industrial appliance comprising a housing provided with a display panel, a support mounted in association with the panel, a printed circuit board mounted on the support and provided with at least one electric lamp, and at least one illuminable element mounted in the panel and provided with a light-conducting stem arranged to transmit light from

the or a respective lamp to the element.

2. An appliance as claimed in claim 1, wherein the or each illuminable element is formed integrally with the respective stem.

5 3. An appliance as claimed in either claim 1 or claim 2, wherein the support is constructed as a cover element which is attached to the printed circuit board to conceal the or each lamp and which is provided with a respective aperture for the light-conducting stem of the or each element.

10 4. An appliance as claimed in claim 3, wherein the cover element comprises plastics material.

15 5. An appliance as claimed in either claim 3 or claim 4, wherein the cover element is attached to the printed circuit board by way of snap connecting means.

20 6. An appliance as claimed in any one of claims 3 to 5, wherein the cover element is provided with mounting devices for mounting the cover element in association with the panel.

25 7. An appliance as claimed in any one of the preceding claims, wherein the printed circuit board is provided with projecting socket means to receive plug means for the supply of electric current to the or each lamp.

8. An appliance as claimed in any one of the preceding claims, wherein the panel comprises a cladding layer on a side thereof facing outwardly of the housing.

30 9. An appliance as claimed in claim 8, wherein

the cladding layer comprises one of metal, wood and plastics material.

35 10. An appliance as claimed in any one of the preceding claims, wherein the support is mounted directly on the panel.

11. An appliance as claimed in any one of claims 1 to 9, further comprising a mounting element which is attached to the housing and carries the panel and the support.

40 12. An appliance as claimed in claim 11, wherein the mounting element is provided with support and retention means for the panel and is arranged to mount the panel in a predetermined relationship to a wall of the housing.

45 13. An appliance as claimed in either claim 11 or claim 12, wherein the mounting element is provided with apertures for reception of mounting devices of the support and the stem of the or each illuminable element.

50 14. An appliance as claimed in claim 13, wherein the stem of the or each illuminable element is inserted through respective apertures in the mounting element and support, and the shape and length of the stem are such that it extends to the immediate vicinity of the or a respective lamp.

55 15. A domestic or industrial appliance as claimed in claim 1 and substantially as hereinbefore described with reference to the accompanying drawings.